

TWO SOFTWARE TOOLS (V3MA AND CTMA) MEASURING CT-BASED IMPLANT MIGRATION HAVE COMPARABLE PRECISION

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Introduction

Aseptic loosening of knee implants is the cause of 15-30% of knee revision surgeries. The gold standard for monitoring migration of implants with high precision is radiostereometric analysis (RSA). To overcome RSA limitations, including the need for intraoperative marker placement, CT-based radiostereometric analysis (CT-RSA) software tools have been developed, like the novel V3MA (RSACore)(1).

Objectives

This study evaluates the precision of V3MA software in assessing tibial implant migration compared to existing software (CTMA, Sectra AB). Additionally, the effect of CT scanner models on precision was assessed.

Methods

CT scans were re-used from a porcine knee implant cadaver study, acquired using two CT scanners (GE and Siemens, 7 scans each)(2). 21 pairwise comparisons were performed per CT scanner. By aligning paired CT scans, the maximum total point motion (MTPM, mm) of the tibial implant was computed. As the implant was rigidly fixed to the bone, any detected migration was attributed to measurement noise, reflecting the method's precision. The precision of both software tools was compared per scanner, expressed as MTPM with 95% confidence interval (CI).

Results

The precision of V3MA and CTMA using the same GE scanner did not vary (V3MA-GE-MTPM: 0.07mm, CI [0.03-0.11]; CTMA-GE-MTPM: 0.08mm, CI [0.03-0.12]). Both software tools demonstrated superior precision using the GE scanner compared to the Siemens scanner (V3MA-Siemens-MTPM: 0.12mm, CI [0.00-0.24]; CTMA-Siemens-MTPM: 0.11mm, CI [0.04-0.19]).

Conclusion

The new V3MA software measures implant migration with a comparable precision as CTMA under zero-motion assumptions. Minor inter-scanner differences in CT-RSA precision exist for both software tools.

References

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